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ABSTRACT

This manual shows health providers how to perform precisely and expertly each step of several procedures used in screening children for nutritional problems. It is intended for all health providers who are involved in weighing and measuring children, recording and plotting measurements on growth charts, taking blood samples to test for iron deficiency anemia, and checking children for dental problems. Step-by-step instructions for performing each of these procedures are provided. While many health providers may be familiar with the information that is presented, the manual contains many ideas for improving the accuracy of nutritional screening. (Author/RH)

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NUTRITIONAL SCREENING OF CHILDREN

A Manual for Screening & Followup

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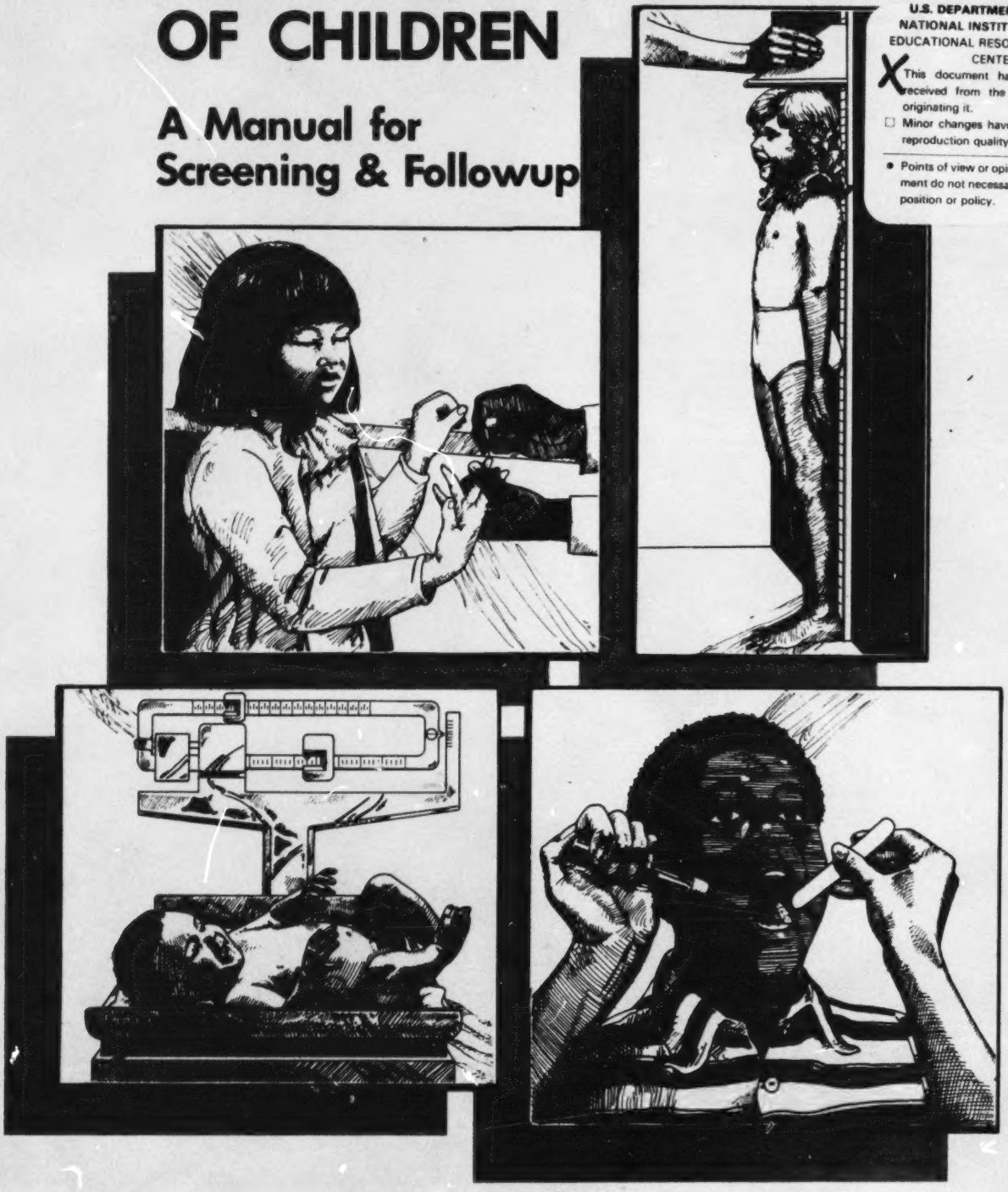

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Bureau of Community Health Services

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INTRODUCTION

Screening for nutritional problems in children plays a vital role in preventing illness and fostering a child's growth and development. Successful screening for the most common nutritional problems found in American children — overweight, underweight, delayed or slow growth, iron deficiency anemia, and dental problems — depends upon using accurate methods for measuring and testing.

This manual instructs health providers in how to perform each screening step in a precise and expert way. It is intended for all health providers who are involved in weighing and measuring children, plotting measurements on growth charts, taking blood samples, and checking children for dental problems. Step-by-step instructions for performing each of these procedures are provided. While many health providers may be familiar with the information that is presented, the manual contains many ideas for improving the accuracy of nutritional screening.

The manual has been tested in clinics to take into account the probems you face every day. If the procedures and equipment in your clinic are somewhat different from those described in this manual, you should still be able to use the information provided. If you are just learning how to conduct nutritional screening, the procedures may seem complicated at first, but with practice you should become an expert and be able to conduct every step of the screening routinely. If you have any questions about any of the screening procedures in this manual, be sure to ask your supervisor for advice.

To give you a quick reference for checking the accuracy of your screening techniques, a colorful, attractive screening checklist has been prepared to go along with this manual. It is designed for displaying at a convenient place at the screening site.

In addition, a leaflet entitled "Nutrition Checkups for Children — Tips for Parents" has been prepared to explain the screening process and the importance of followup to parents. Be sure to give every parent a copy of the leaflet and take time to discuss those sections which pertain to them. The leaflet can be used independently, but it will be much more effective when it is used along with counseling. To order additional copies of this manual, the screening checklist, and the parents' leaflet, please write to the address printed on the back cover of this publication.

As a health provider, you can help:

- **Conduct the screening for nutritional problems in children.**
- **Identify areas where deficiencies or problems may exist.**
- **Refer the patient to the nutritionist, nurse, or physician for diagnosis and treatment.**

Parents will often ask you to explain the screening procedures or other information they don't understand. You can play an important role by encouraging them to follow the instructions they are given for remedying their child's health problems.

Nutrition screening is no easy task — it often takes two, three, or four measurements of a crying, squirming child to obtain a precise measurement. If some of your clinic procedures are different from those described in the manual, or if manual procedures appear too complicated or time consuming, please consider that accurate measurement and testing are essential for following a child's development over the years. The success of your efforts will also depend upon creating a spirit of cooperation among parents and children and the health team.

MEASURING LENGTH, HEIGHT, AND WEIGHT

Measurements of length or height and weight provide important clues about health and nutritional well-being. These measurements can tell you when a child's growth is delayed, and when a child is overweight or underweight. By examining a child's weight and height over time, you can get a picture of how a child is growing.

Since height and weight measurements are important in identifying children who may be at risk for — or already have — a nutritional problem, it is essential that you follow the correct measuring procedures. Every measurement of height and weight must be done carefully, without error, and must be recorded *accurately* on the child's chart.

The following sections provide step-by-step instructions for taking accurate length, height, and weight measurements for infants and children. The best way to learn how to use the equipment and to measure a child correctly is to practice. The more you practice, the more comfortable you will feel about performing these steps.

HELPFUL HINTS

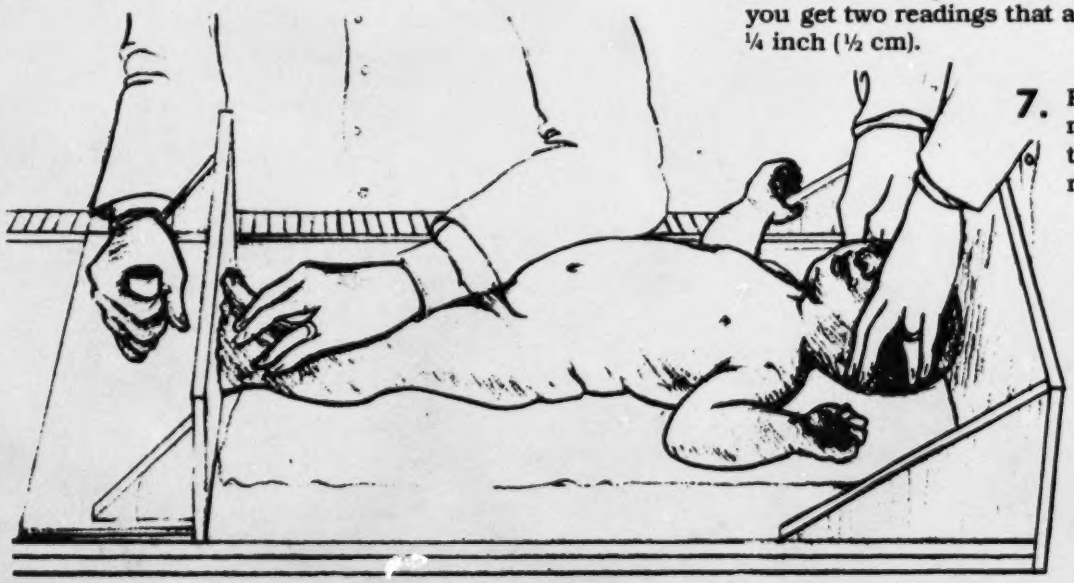
- **Keep the measuring equipment in good condition at all times. Be sure the scales are balanced before you start, so patients won't have to wait while adjustments are made.**
- **Ask another staff member or the child's parent to help you measure infants. If you ask parents to help you, be sure they follow your instructions.**
- **Before you start, remove the child's outer clothing, including hats and shoes. Infants and children should be weighed wearing only underwear.**
- **Keep growth charts, pencils, and paper handy so you can record the measurements right after you take them.**
- **Be sure you are using the correct measurement system for recording your measurements. Standard measures are inches (in), ounces (oz), and pounds (lb). Metric measurements are millimeters (mm), centimeters (cm), grams (gm), and kilograms (kg).**
- **Improve the accuracy of your measurements by saying them out loud and writing them down at once.**

MEASURING AN INFANT'S LENGTH

During the first 2 years of life, children should be measured lying down on a measuring board. Children can be measured lying down up to age 3.

Before you start, be sure that the measuring board is working. The footboard should slide easily but should not be so loose or worn that it slips when taking the length measurement. You will need an assistant to measure children under 2.

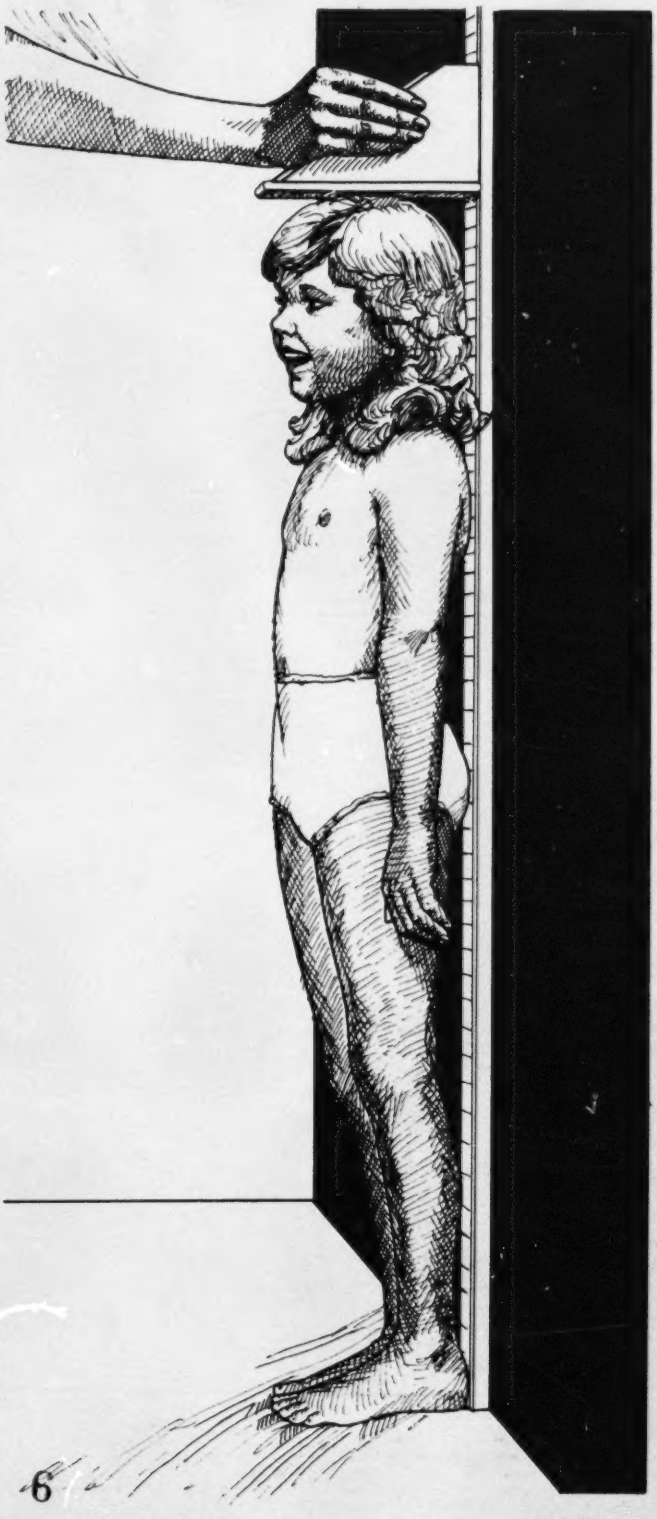
1. **Lay the child down face up on the measuring board. The body must be straight, lined up with the measuring board.**
2. **Have an assistant or the parent hold the infant's head firmly against the headboard until the measuring is completed.**
3. **With one hand, hold the infant's knees, completely straightening the infant's hips and knees.**
4. **With the other hand, move the footboard until it is resting firmly against the infant's heels. The toes should point directly up.**
5. **Read the measurement to the nearest ⅛ inch (1 mm) and jot it down.**
6. **Slide the footboard away from the infant's heels and start again. To be sure you were correct, measure the child's length and jot it down as many times as necessary until you get two readings that agree within ¼ inch (½ cm).**
7. **Record the final measurement on the child's chart right away.**



MEASURING A CHILD'S HEIGHT

In nutrition screening, the word stature is also used to describe a child's height. Children 2 years and older may be measured standing, but you will probably need an assistant and much patience to gain the child's cooperation.

Use a standard measuring board or a metallic measuring tape or yardstick attached to a flat wall with no baseboard or molding. Cloth and plastic tapes can stretch and will not be accurate. *Measuring rods attached to scales should never be used because the surface on which the child stands is not always stable and the measuring rod's hinge tends to become loose, causing inaccurate readings.*



1. **Remove all outer clothing, including hats and shoes. Measure the child in his or her underclothing.**

2. **Have the child stand on a bare flat surface with heels slightly apart, and back as straight as possible. Heels, buttocks, and shoulder blades should touch the wall or measuring surface. Eyes should be straight ahead, arms at sides, and shoulders relaxed. Be sure that the child's knees are not bent and that the heels are not lifted from the floor.**

3. **Slowly, lower the movable headboard until it touches the crown (or top) of the head firmly. Make sure the headboard is not just resting on the hair but is actually touching the top of the head and is level.**

4. **Check the child's position, read the height measurement to the nearest ⅛ inch (1 mm) out loud, and jot it down.**

5. **Take the headboard away, check the child's position, and repeat the measurement as many times as necessary, jotting down the height until you get two readings that agree within ¼ inch (½ cm).**

6. **Record the second measurement that agrees within ¼ inch (½ cm) on the child's chart at once.**

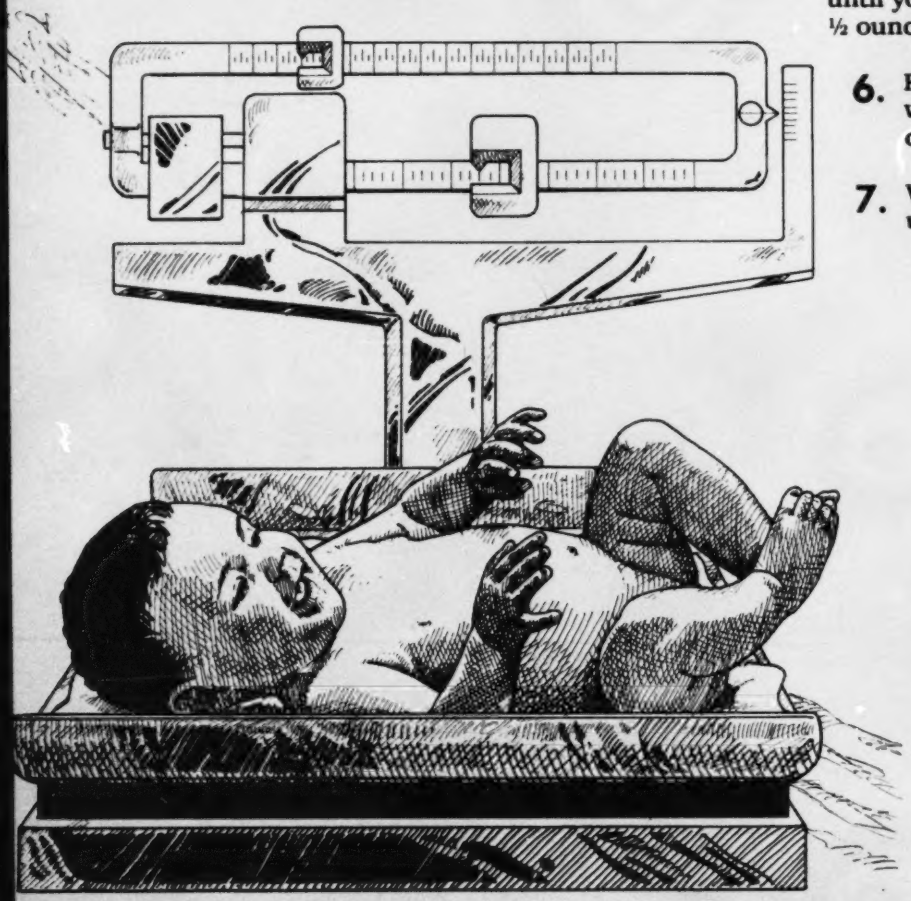
WEIGHING INFANTS

Use a table model beam scale to weigh infants and small children. The scales should be checked and adjusted for accuracy every 3 or 4 months. *A bathroom scale or spring-type scale should not be used since they are not always accurate.*

A beam scale usually consists of two beam weights — the upper fractional beam weight and the lower main beam weight. On standard scales, the markings are often ½ ounce, 1 ounce, 4 ounces (¼ pound), and 1 pound. On metric scales, they are divided into 10-gram and 100-gram segments.

Before weighing an infant, you need to balance the scale. Begin by checking to see that nothing is on the scale. Move both weights to zero and turn the adjustment screw until the marker points to zero. The scale is balanced when the marker is centered.

If you use a paper drape on the scale when infants are weighed, balance the scale at zero with the drape on it.



1. Remove outer clothing including shoes, caps, or bonnets. Infants may remain in dry diapers.
2. After the scale has been balanced and the weights are in the zero position, place the undressed infant in the center of the scale.
3. Move the lower weight away from zero until the marker drops below the center point. Then move the weight back toward zero until the marker is just above the center point.
4. Move the upper weight away from zero until the marker is centered. You may need to move the upper weight back and forth a few times until the scale is balanced.
5. Read the weight measurement to the nearest ½ ounce (10 gms). Repeat the measurement until you get two weights that agree within ½ ounce (10 gms).
6. Record the second reading that agrees within ½ ounce (10 gms) on the child's chart right away.
7. When you are finished, return both the upper and lower beam weights to zero.

WEIGHING CHILDREN 2 YEARS AND OLDER

Use a floor model beam scale to weigh older children. Children should be weighed in their underclothing and without shoes. Every effort should be made to prevent children from feeling embarrassed.

Before you weigh the child, balance the scale. Make sure no objects are on the scale. Move the weights to zero and turn the adjustment screw until the scale is balanced. The scale is balanced when the marker indicates zero.

1. **After balancing the scale, and with the weights placed in the zero position, have the child stand in the center of the scale, feet slightly apart.**

2. **Move the lower weight away from zero until the marker drops below the center point. Then slide the weight back toward zero until the marker is above the center point.**

3. **Move the weight on the upper beam away from zero until the marker is centered. You may need to move the upper weight back and forth a few times until the scale is balanced.**

4. **Read the weight measurement to the nearest ¼ pound (100 gms) and jot it down.**

5. **Have the child step off the scale and return the weights to zero. Repeat the measurement until you get two readings that agree within ¼ pound (100 gms).**

6. **Record the second measurement that agrees within ¼ pound (100 gms) on the child's chart.**

7. **When you are finished, return both the upper and lower beam weights to zero.**

RECORDING AND PLOTTING MEASUREMENTS ON GROWTH CHARTS

Growth charts show how a child's length or height and weight compare with those of other children in the United States. They are tools that help the health provider separate children who are within the average range of weight or height for age and sex from those who may be at risk for overweight, underweight, or delayed growth.

The NCHS growth charts should be a permanent part of a child's health record.[1] At each visit, the child's measurements should be added to the charts to enable the health team and the parents to look at the child's growth pattern over time. If children move or leave the clinic, their growth charts should be sent to their new health care providers. The following sections describe how the growth charts are set up and how to record and plot a child's measurements.

HOW THE GROWTH CHARTS ARE SET UP

Four sets of growth charts are used for recording length or height and weight measurements. Separate charts are available for boys and girls from birth to 36 months of age and for boys and girls 2 to 18 years of age.

Use the charts for birth to 36 months as long as the child's *length* is measured while lying down. Use the charts for boys and girls 2 to 18 years when the child is measured in a standing position. For example, the length of a 2½ year old child taken lying down would be entered on the chart for birth to 36 months. If the height is measured while a 2½ year old child is standing up, it would be entered on the chart for children 2 to 18 years.

The date on which the measurements are taken, the child's age to the nearest year and month (e.g., 4 years, 10 months), and the length, height, and weight measurements all should be recorded in the boxes provided. The following measurements are actually plotted on the growth charts:

Girls and Boys Birth to 36 months	Girls and Boys 2 to 18 Years
Length for Age	Stature for Age
Weight for Age	Weight for Age
Weight for Length	Weight for Stature
Head Circumference for Age[2]	

The growth charts are printed on graph paper. Each measurement that is plotted on the growth chart (as described below) is placed at a point where the horizontal lines (the lines that go from left to right) and the vertical lines (the lines that go from top to bottom) meet. This point is called the intersection.

UNITS OF MEASUREMENT

The growth charts are set up for marking or plotting length, height, and weight in standard measurements (inches, pounds) or in metric measurements (centimeters, kilograms). The charts use the following abbreviations for these measurements:

in = inches

cm = centimeters (or 0.4 inch)

lb = pounds

kg = kilograms (or 2.2 pounds)

The same measurement system — standard or metric — should be used by all staff members. If you recorded the child's measurements in inches or pounds, be sure you use the lines for inches and pounds and not the lines for centimeters and kilograms when plotting these measurements.

THE PERCENTILE CURVES

Growth charts can tell you how each child's measurements compare with a sample of 100 children of the same sex and age. Each chart has a set of curves or lines with the numbers 5, 10, 25, 50, 75, 90, and 95 printed along the right hand side. These are called *percentile curves*. Each one shows the percentages of boys and girls in the U.S. population who are below that measurement. For example, if a 10-year old girl weighs 72 pounds, her weight for age is at the 50th percentile. This means that 50 percent of girls her age weigh less than she. When using the growth charts, check to be sure that you are using the correct chart for the age and sex of the child.

[1] Health centers may print growth charts if they have access to photo-offset printing facilities. A package of materials to reproduce the National Center for Health Statistics (NCHS) Growth Charts may be obtained with no charge except return postage. Write to: Nutrition Division, Center for Health Promotion and Education, Centers for Disease Control, 1600 Clifton Road,N.E., Atlanta, GA 30333. Growth charts can also be obtained from state health agencies or the educational divisions of two pharmaceutical firms, Ross Laboratories and Mead-Johnson.

[2] Head circumference measurements are usually taken for children up to 2 years old. They are not addressed in this manual because they are not considered to be a sensitive measure of nutritional status when the child's length and weight are known.

DETERMINING THE CHILD'S AGE

The child's age on the date on which measurements are taken must be determined before you start plotting the measurements. When plotting measurements on the birth to 36 months charts, the child's age must be determined to the nearest month. When plotting measurements on the 2 to 18 years charts, the child's age must be rounded to the nearest ¼ year. Remember that every 3 months equals ¼ year. To figure out a child's age, follow this example.[3]

	Year	Month	Day
Date of Measurement	1981	4	21
Birthdate	-1975	-8	-10
Child's Age	5	8	11 days
	or 5-3/4 years		

As this example shows, you may have to borrow 30 days from the month column and/or 12 months from the year column when subtracting the child's birth date from the date on which the measurements are taken.

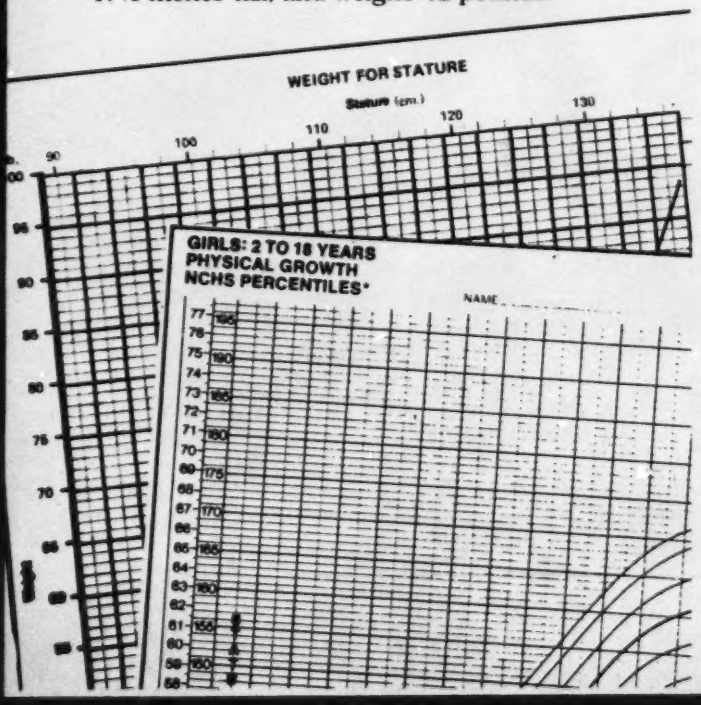
To round off the child's age, follow these rules:

0 — 15	**days**	—	round to the previous month
16 — 31	**days**	—	round off to the next highest month
0 — 1	**month**	—	round to the previous whole year
2 — 4	**months**	—	round off to 1/4 year
5 — 7	**months**	—	round off to 1/2 year
8 — 10	**months**	—	round off to 3/4 year
11 — 12	**months**	—	round off to the next whole year

[3]The guidelines for determining a child's age are adopted from: *Nutrition Screening and Assessment Manual*, Wisconsin Department of Health and Social Services, Madison, WI, 1979.

PLOTTING THE HEIGHT AND WEIGHT MEASUREMENTS

To get a better idea of how to use the growth charts, follow these examples for plotting Sally's measurements. Sally is 6 years and 5 months old, 47½ inches tall, and weighs 42 pounds.



Plotting Height for Age

1. Choose the Stature for Age chart for girls 2 to 18 years.
2. Round off Sally's age of 6 years and 5 months to the nearest ¼ year. According to the rules for determining a child's age, Sally's measurements should be plotted at 6½ years.
3. Looking at the line on the chart labeled *age*, find the line on the graph that goes up from 6½ years.
4. Using a ruler, draw a straight line on the line that goes up the chart from 6½ years.
5. Locate Sally's height — 47½ inches — on the line labeled *stature*, measured in inches.
6. Now draw a line on the 47½ inch line until it meets the 6½ year line. Put a dot where the two lines meet.
7. Sally's height for age is just under the 75th percentile. This means that Sally is taller than 75 percent of girls her age.

Plotting Weight for Age

1. Now choose the Weight for Age chart for girls 2 to 18 years.
2. Looking at the line labeled *age*, find the line on the graph that goes up from 6½ years.
3. Using a ruler, draw a straight line on the line that goes up from the 6½ year mark.
4. Locate Sally's *weight* — 42 pounds — on the line labeled *weight* that runs up and down the side of the chart.
5. Now draw a line on the 42-pound line until it meets the 6½ year line. Put a dot where the two lines meet.
6. Sally's weight for age is just above the 25th percentile. In other words, Sally weighs more than about 25 percent of girls her age.

Plotting Weight for Height

1. Finally, choose the chart labeled Weight for Stature for girls 2 to 18 years.
2. Looking at the boxes across the bottom labeled *stature*, find the line on the graph that goes up from 47½ inches.
3. Now draw a line up from the 47½ inch mark.
4. Looking at the line labeled *weight*, find the line on the graph that goes out from 42 pounds.
5. Using a ruler, draw a straight line on the 42-pound line until it meets the height line. Put a dot where the two lines meet.
6. Sally's weight for height is below the 5th percentile, indicating she may be at risk for underweight.

WHY ACCURACY IS ESSENTIAL

For every child that you screen, be sure that you:

- measure and weigh the child accurately;
- record the correct measurements on the growth chart;
- determine the right age for the child in years and months;
- use appropriate units (inches or centimeters/ pounds or kilograms) for plotting measurements; and
- mark the precise intersection for the child's age, length or height, and weight.

You will be able to identify children who may be underweight, overweight, or growth delayed if you have taken measurements accurately, recorded them correctly, and plotted them precisely. By plotting measurements before the child leaves the clinic you can detect any dramatic changes in the pattern of growth. When a child's current measurements vary by as much as two percentile curves, you should check for errors. When errors are made, you may mistakenly identify a child as having a nutrition problem when he or she really does not, or vice versa. Take care to follow all the steps for accurate assessment all the time. You will avoid errors in interpretation that can cause extra work for the health team and cause worry to parents.

INTERPRETING LENGTH, HEIGHT, AND WEIGHT MEASUREMENTS

The two measurements that are considered the most important in nutrition screening for overweight, underweight, and delayed growth are length or height for age and weight for length or height. By plotting these measurements on the growth charts, you can find out the child's present height and weight status compared to other American children in the same age group. By plotting these measurements over a period of time, you can also determine the child's own particular pattern of growth. For example, by examining a child's measurements over 2 or 3 years, you can identify a child whose height for age has shifted from the 90th percentile to the 50th percentile. While the 50th percentile is within the average range, this range may not necessarily be normal for this particular child.

Helpful clues for interpreting measurements are the parents' height and weight and the child's ethnic or racial background. For example, children from Vietnam, Thailand, Laos, Cambodia, and other countries in Southeast Asia tend to be shorter than most American children. Thus, it is important to remember that if a Southeast Asian girl is found to be much shorter than other children her age, this does not necessarily mean her growth is delayed.

HOW TO TELL IF A CHILD IS OVERWEIGHT

If a child's weight for length or height is at the *95th percentile or above*, or if weight for length or height has moved upward over time crossing into higher percentiles, the child may be at risk for overweight. The child should be referred for assessment and counseling. An appointment should be given to return to the clinic in one month following counseling. At that time, weight and height measurements should be checked again to make sure the pattern of weight gain has not continued to rise. The child's weight should be monitored for several months.

HOW TO TELL IF A CHILD IS UNDERWEIGHT

If a child's weight for length or height is at the *5th percentile or below*, or if the present weight for height is at a lower percentile than previous measurements, the child may be at risk for underweight. The child should be referred for further assessment and counseling, and should return to the clinic one month following counseling. At that time weight and height measurements should be checked to determine if the child has gained weight and if the rate of weight gain has increased. Monitoring the child's weight should be continued for several months.

HOW TO TELL IF A CHILD'S GROWTH IS DELAYED

If a child's height for age is at the *5th percentile or below*, or if present height is at a lower percentile than previous measurements, the child's growth may be delayed. The child's diet and certain medical problems may be causing delayed growth. A medical history and exam, as well as dietary habits, should be evaluated carefully by the health team. The child may need to be referred for additional tests to determine why he or she is growing too slowly. Infants should be monitored through clinic visits every month until height is increasing at a steady rate. Older children (above age 1) grow more slowly and should return in 3 months.

The table below shows how you can tell if a child may have a problem and what needs to be done to remedy that problem.

SCREENING AND FOLLOWUP

	Overweight	Underweight	Delayed Growth
Screening method	Weight for height	Weight for height	Height for age
Criteria to flag a problem	• 95th percentile or above • higher percentile than earlier measurements • any major change in percentiles	• 5th percentile or or below • lower percentile than earlier measurements • any major change in percentiles	• 5th percentile or below • lower percentile than earlier measurements • any major change in percentiles
Action to take	Refer for assessment and counseling	Refer for assessment and counseling	Refer for assessment and counseling
Followup needed	Measure weight for height in 1 month	Measure weight for height in 1 month	Measure height for age in 1 month for infants and in 3 months for children
Monitoring required	Until problem is resolved	Until problem is resolved	Until problem is resolved

IRON DEFICIENCY ANEMIA

All humans need oxygen to live. Oxygen is carried to all parts of the body by blood. It is *hemoglobin* in the red blood cells which carries oxygen. Hemoglobin contains iron; thus, a deficiency of iron will cause a deficiency of hemoglobin in the blood. This lowered hemoglobin indicates anemia.

CHILDREN AT RISK

Iron deficiency anemia is the most common form of anemia in children. Those most likely to develop it are:

- premature and low birth weight infants
- children between the ages of 6 months and 3 years
- twins or other multiple birth infants
- teenage boys and girls
- children from low income families who may not be getting an adequate diet.

SCREENING TESTS FOR IRON DEFICIENCY ANEMIA

Hematocrit and hemoglobin levels are measured to determine iron deficiency anemia. These are inexpensive tests that can be completed quickly before the child leaves the clinic. Hematocrit is a measurement of the amount (by percentage) of red blood cells in the blood. The hemoglobin test measures the concentration of hemoglobin in a given amount of blood. Although the tests can be used alone, the combination of results of both tests provides a better screening of the problem.

Screening for anemia should be done the first time a child comes to the clinic. If the screening results are normal, the schedule recommended by the American Academy of Pediatrics for repeat screening of the hematocrit or hemoglobin is at the following ages:

6-7 months
36-37 months or 5-6 years
11-12 years.

PERFORMING A HEMATOCRIT TEST

The health provider's responsibility for ordering tests, obtaining blood samples, and recording results will vary in each clinic. A finger stick is all that is needed to conduct both hemoglobin and hematocrit tests. Step-by-step instructions for performing a hematocrit test follow.[4] The hematocrit test is the blood test most commonly used by health clinics.

These instructions are for drawing blood from a child's finger, although blood may also be obtained from a child's ear. For infants it may be easier to get blood from the toe or heel.

1. Increase the circulation in the finger by having the child hold his or her hand down and make a fist several times.

2. Grasp the child's entire hand and select either the middle or fourth (ring) finger for drawing blood.

3. Cleanse the skin with a 70 percent alcohol swab and *dry* the finger before you puncture it.

4. Puncture the skin with a sterile, disposable stylet. Puncture the skin deep enough to allow blood to flow freely.

5. The first drop of blood that appears should be wiped away with a dry gauze pad. Don't use cotton for this purpose.

6. Have a sterile capillary tube ready. As soon as the second drop of blood appears, place the end of the tube farthest from the calibration mark at the point of puncture. Fill the tube to the black mark. Whenever possible, fill two capillary tubes. If using an uncalibrated tube, fill it 2/3 to 3/4 full.

7. Avoid squeezing the child's finger since this may cause blood and tissue fluid to mix which will affect the accuracy of the test. If the blood does not flow freely, you will need to puncture the finger again.

8. Rotate the blood sample gently 5 to 10 times to mix the heparin (anti-coagulant) in the tube with the blood.

9. To seal the tube with plastic clay, place one end of the tube in the clay, putting the finger over the other end of the tube. Twist gently to seal the end with clay. Remember — capillary tubes break easily.

10. Open the transparent cover of the centrifuge and the cover of the head of the machine and insert the tubes in the numbered channels. Place the sealed end of the tube toward the outer rim of the head, flush against the black rubber gasket. Always balance the tubes in the machine. As many as six tubes can be put in simultaneously. If you are including blood samples of several different children,

[4]The instructions for performing a hematocrit test are adapted from: *Nutrition Screening and Assessment Manual*, Wisconsin Department of Health and Social Services, Madison, WI, 1979.

be sure to write down each child's name and the number of the channel containing that child's blood. Secure *both* covers. Rotate the timer knob to spin the head for *five minutes.*

11. Tubes can stand up to ½ day before centrifuging, but must be read as soon as the centrifuge stops. However, try to spin the tubes as soon as possible so that the health professional has the report before the patient leaves the clinic.

12. To read a precalibrated tube, which was filled to the calibration mark, place the tube in the slot in the centrifuge which contains a scale. Shift the tube so that the division between the clay and packed red cells lines up exactly with the "0" mark on the scale. The hematocrit value is then read from the scale at the point between the plasma and packed red cells. An uncalibrated tube, a calibrated tube with air bubbles, or a calibrated tube with too much or too little blood must be read on a special card designed for this purpose (e.g., Lancer Critocap Microhematocrit Capillary Tube Reader; price is $3.50). Follow the directions on the card.

HOW TO TELL IF A CHILD HAS IRON DEFICIENCY ANEMIA

Once blood samples have been collected and tested in the lab, anemia may be diagnosed. It is a good idea to ask parents to remain in the clinic until the test results are known. If anemia is detected, it can be followed up before the child leaves the clinic. Children having hemoglobin or hematocrit values below the following levels should be considered anemic and referred to a health professional.

Age (year)	Sex	Hemoglobin Concentration[5] (gm/100 ml)	Hematocrit[5]
½-10	Both	11.0	34
10-14	Both	12.0	37
14+	Male	13.0	41
14+	Female	12.0	37

Source: Fomon, Samuel J., *Nutritional Disorders of Children*

[5]Adjust the hemoglobin and hematocrit values at high altitudes as follows:

- Less than 800 meters above sea level — no adjustment
- 800-1300 meters above sea level — add 0.5 gm hemoglobin and 2 hematocrit points
- Over 1300 meters above sea level — add 1.0 gm hemoglobin and 3 hematocit points

FOLLOWUP FOR IRON DEFICIENCY ANEMIA

If a child has iron deficiency anemia, an iron supplement is usually prescribed by the doctor. Children on an iron supplement should return to the clinic in 4 weeks to have their blood levels checked. If the hematocrit and/or hemoglobin level has not increased after 4 weeks of iron therapy, the physician should be notified so that further evaluation can be done to diagnose the problem. Since iron deficiency is not the only cause of anemia, other tests may be needed. Continue to monitor children whose hematocrit and/or hemoglobin levels have increased, but are not yet normal.

DENTAL PROBLEMS

Dental problems such as tooth decay and infected gums occur among children of all age groups, even among toddlers. Sugar is a major cause of tooth decay. Sugary food, remaining or sticking to the teeth, allow bacteria growing on teeth's surfaces to combine with saliva and to produce acid. This acid then breaks down the enamel of the teeth.

CHECKING FOR DENTAL PROBLEMS

Healthy teeth are important not only for eating and talking, but also for the child's appearance. Every child should be checked for tooth decay and other signs of dental problems.

WHAT TO LOOK FOR

- Dental cavities (black or brown spots on the teeth and any obvious holes in the teeth).
- Stained or discolored teeth.
- Infected gums (red, bleeding gums).
- Sores and infections in other areas of the mouth (abnormal swelling, redness).
- Crooked teeth, missing teeth, or teeth growing in unusual places.

Children who show signs of any of these problems should be referred immediately for professional dental care. They should be followed up in 1 month to be sure that dental treatment was received.

HOW TO CHECK FOR DENTAL PROBLEMS

To perform a thorough checkup of a child's mouth and teeth, you will need the following: a disposable tongue blade, a penlight or flashlight, a dental screening form, and a chair for the child.

1. Take a quick look at the child's face and lips to see if sores or swelling are present.
2. Have the child hold his or her teeth together and make a big smile. Look at the front teeth and gums for anything that appears abnormal.
3. While the child's teeth are still together, use the tongue blade to gently pull back the right cheek. Look for any abnormalities in the back teeth and gums. Use the penlight to provide light for these areas. Repeat with the left cheek.
4. Now tell the child to open the mouth. Inspect the roof of the mouth and the palate. Use the tongue blade on the middle of the child's tongue to keep it from wandering around the mouth and blocking your view.
5. While the mouth is still open, gently pull the right cheek out with the tongue blade and inspect the teeth and gums on the upper right side of the mouth. Repeat this step for the lower right side of the mouth, upper left side, and lower left side of the mouth.
6. With the mouth open, ask the child to touch the roof of the mouth with the tongue. Then place the tongue blade under the tongue and inspect the lower front teeth and the bottom of the mouth and tongue.
7. Write your findings on the dental screening form.

By following these seven steps, you will be able to perform a systematic and thorough dental inspection. The total time for these procedures will take only several minutes.

FLUORIDE

Fluorides help to prevent and control dental caries. Fluorides are most effective in preventing tooth decay when they are incorporated into the community water supply. If your community does not have fluoridated water, a fluoride supplement in the form of tablets, drops, or mouth rinse may be prescribed by the physician or dentist. These fluoride supplements help strengthen teeth that are forming in infants as well as the permanent teeth children develop.

WHAT TO TELL PARENTS

The following points about good dental hygiene practices and prevention of dental problems should be discussed with parents.

Care of Infants

- Clean the infant's gums with a clean cloth, gauze, or cotton. This should be done every day as soon as the baby is born.
- Avoid giving infants sweetened fluids (soda pop, punch, etc.) in a bottle. The longer sugar remains in contact with the teeth, the more likely it is that cavities will develop.
- Don't put children to bed with a bottle containing formula, milk, juice or other sweet drinks. The sugar from these fluids will stay in contact with the child's teeth during the night and speed up the development of tooth decay.

Tooth Cleaning

- Toddlers' teeth should be cleaned daily. Show parents how to wrap fine gauze around the index finger and gently rub the surfaces of the teeth and gums.
- It is important to begin daily tooth brushing during the child's second year. Advise parents to place their hand over the child's hand on the toothbrush and to clean the teeth by guiding the child's hand. If this does not entirely clean the child's teeth, the parent should brush the child's teeth without the child's assistance. Parents should supervise their child's toothbrushing at least until the child can do a good job without help.
- Children should brush their teeth after *every* meal and just before going to bed at night.

Sweet Snacks

- If sweet snacks are eaten, they should be eaten at once and not nibbled all during the day.
- Soft drinks, sticky candies such as caramel and jelly beans, sugared chewing gum, and hard candies such as lollipops should be avoided. Dried fruits also stick to the teeth.
- Instead of sweets, children should be encouraged to snack on more nutritious foods such as fresh fruits, bite-size pieces of raw vegetables, or cheese and crackers.

Followup for Dental Problems

After screening and referral for appropriate professional care, followup should include:

- Recommending that children go to the dentist at least once a year.
- Making sure children keep their appointments.
- Seeing that dental hygiene practices are followed.